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# Effect of Preemergence Herbicide on Wildflower Establishment

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This study was initiated to evaluate wildflower establishment using a pre-emergence herbicide. Fifty species of wildflowers (Table 1) were established on a Sharpsburg silty-clay loam (Typic Argiudoll), with a 6.9 pH, near Mead, Neb. Forty-seven (Table 1) wildflowers were established near Hubbard, Ore., on a Willamette sandy loam (Pachic Ultic Argixeroll) with a 6.6 pH. Both studies used a split-plot design, with herbicide treatment as main plots and wildflowers as subplots. Each treatment consisted of two replicates.

Herbicide treatments included an untreated control and a combination of S-ethyl dipropylthiocarbamate (EPTC) at 2.3 kg-ha<sup>-1</sup> and  $\alpha,\alpha,\alpha$ -trifluoro-2,6-dinitro-N,N-dipropyl-p-toluidine (trifluralin) at 0.6 kg-ha<sup>-1</sup>. Applications were made with a boom-sprayer, and treatments were incorporated with a Lily Rotta (Lely Industries, N.V. Maasland, Holland) cultivator immediately after application. Wildflowers were broadcast-seeded at 2 g pure live seed per plot. Irrigation was applied daily at 4 mm-day<sup>-1</sup> for 6 weeks after seeding and 13 mm-week<sup>-1</sup> thereafter.

In the Nebraska study, tall plains coreopsis (*Coreopsis tinctoria* Nutt.) and cosmos (*Cosmos bipinnatus* Cav.) plants lodged after heavy rains on 15 (33 mm) and 19 July (60 mm) in the herbicide-treated plots but not the control. The lodged plants continued to grow, but remained lodged throughout the growing season. Herbicide-treated Indian blanket (*Gaillardia pulchella* Foug.) plants had uneven growth and a 2-week bloom initiation delay when compared to the control. After bloom, flowering appeared equal for control and herbicide treatments. About 35% of all species were adversely affected by the herbicide treatment.

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Table 1. Stand ratings of annual and perennial wildflower species treated before establishment with EPTC/trifluralin (En) in studies conducted at Mead, Neb., and Hubbard, Ore.

Species	Nebraska		Oregon	
	Control	E/T	Control	E/T
Annuals				
Spurred snapdragon ( <i>Linaria maroccana</i> Hook.f. <sup>2</sup> )	8.5 <sup>y</sup>	7.5	9.0	9.0
Tall plains coreopsis ( <i>Coreopsis tinctoria</i> Nutt.)	8.0	8.0	9.0	8.5
California poppy ( <i>Eschscholzia californica</i> Cham.)	8.0	6.5	9.0	9.0
Baby's breath ( <i>Gypsophila elegans</i> Bieb.)	8.0	1.5	9.0	1.0
Garland chrysanthemum ( <i>Chrysanthemum coronarium</i> L.)	7.5	7.5 <sup>z</sup>	9.0	9.0
Corn poppy ( <i>Papaver rhoeas</i> L.)	7.5	1.5	9.0	2.0
Mountain phlox [ <i>Linanthus grandiflorus</i> (Benth.) Greene]	7.5	1.0	7.0	5.0
Cosmos ( <i>Cosmos bipinnatus</i> Cav.)	7.5	6.5	4.5	4.0
Starflower ( <i>Scabiosa stellata</i> L.)	7.0	7.5	---	---
Dwarf cornflower ( <i>Centaurea cyanus</i> L.)	7.0	5.5	8.5	9.0
African daisy ( <i>Dimorphotheca sinuata</i> DC.)	7.0	8.0	8.0	7.0
Globe gilia ( <i>Gilia capitata</i> Sims)	7.0	1.5	8.0	1.0
Scarlet flax [ <i>Linum grandiflorum</i> Desf. 'Rubrum']	6.5	6.5	9.0	9.0
Birds eyes ( <i>Gilia tricolor</i> Benth.)	6.5	1.0	8.0	2.0
Annual Indian blanket ( <i>Gaillardia pulchella</i> Foug.)	6.5	5.5	5.5	5.0
Tall godetia [ <i>Clarkia amoena</i> (Lehm.) A. Nels. & Macbr.]	5.5	3.0	9.0	9.0
Catchfly ( <i>Silene armeria</i> L.)	5.0	1.0	7.5	4.5
Mountain garland ( <i>Clarkia unguiculata</i> Lindl.)	5.0	4.0	7.5	6.5
Blue bells ( <i>Phacelia campanularia</i> A. Gray.) -	5.0	1.5	6.5	3.5
Tidy tips [ <i>Layia platyglossa</i> (Fisch. & C.A. Mey.)A. Gray]	5.0	5.5	9.0	8.0
Rocket larkspur [ <i>Consoldia orientalis</i> (J. Gay) Schrödinger]	3.0	4.0	8.5	4.5
Baby blue eyes ( <i>Nemophila menziesii</i> Hook. & Arn.)	2.0	2.0	9.0	5.0
Sweet alyssum [ <i>Lobularia maritima</i> (L.) Desv.]	1.0	1.0	8.0	5.0
LSD 5%	2.2		2.4	
Perennials				
Black-eyed susan ( <i>Rudbeckia hirta</i> L.)	9.0 <sup>y</sup>	9.0	9.0	8.5
Tall evening primrose ( <i>Oenothera erythrosepala</i> Borb.)	8.5	8.5	---	---
Creeping zinnia ( <i>Sanvitalia procumbens</i> Lam.)	8.5	7.5	---	---
Prairie coneflower [ <i>Ratibida columnifera</i> (Nutt.) Woot. & Standl.]	8.0	7.0	8.0	7.0
White yarrow ( <i>Achillea millefolium</i> L.)	8.0	8.0	9.0	8.0
Wild thyme ( <i>Thymus serpyllum</i> L.)	8.0	2.5	8.5	2.0
Roman chamomile [ <i>Chamaemelum nobile</i> (L.) All.]	8.0	8.0	---	---
Dames rocket ( <i>Hesperis matronalis</i> L.)	7.5	6.5	9.0	8.5
Blue flax [ <i>Linum perenne</i> subs. <i>Lewisii</i> (Pursh) Hult]	7.5	7.0	8.0	8.5
Johnny jump-up ( <i>Viola cornuta</i> L.)	7.0	7.0	8.5	8.0
Red yarrow ( <i>Achillea millefolium</i> L. 'Rubra')	6.0	7.5	9.0	9.0
Maiden pinks ( <i>Dianthus deltoides</i> L.)	6.0	1.0	8.0	2.0
Dwarf lance-leaved coreopsis ( <i>Coreopsis lanceolata</i> L.)	6.0	6.0	3.5	8.0
Dwarf columbine ( <i>Aquilegia vulgaris</i> L.)	5.5	2.5	2.5	2.5
Siberian wallflower ( <i>Erysimum hieraciifolium</i> L.)	5.5	6.5	6.0	5.0
Small burnet ( <i>Poterium sanguisorba</i> L.)	5.5	6.5	---	---
Forget-me-not ( <i>Myosotis sylvatica</i> Hoffm.)	5.0	1.0	9.0	4.5
Purple coneflower [ <i>Echinacea purpurea</i> (L.) Moench]	4.5	4.0	7.5	3.5
Rocky mountain penstemon ( <i>Penstemon strictus</i> Benth.)	4.5	1.0	9.0	5.0
Sweet williams ( <i>Dianthus barbatus</i> L.)	4.0	1.0	7.5	4.0
Missouri primrose ( <i>Oenothera missouriensis</i> Sims)	2.0	2.5	6.5	7.5
Snow-in-summer ( <i>Cerastium biebersteinii</i> DC.)	2.0	1.0	9.0	6.0
English wallflower ( <i>Cheiranthus cheiri</i> L.)	1.5	2.0	8.0	9.0
LSD 5%	2.8		2.8	

<sup>1</sup>Hortus Third. 1976. Macmillan, New York.

<sup>2</sup>Stand values were based on a 1 to 9 rating scale, with 1 = 1% to 10% and 9 = 90% to 100% stand. Values are means of two replications per treatment.